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RESEARCH ARTICLE

Type-D Personality in Unemployed Subjects: Prevalence, Self-Efficacy and Heart Rate Variability/Autonomic Response

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Abstract:

Background:

Unemployment may impair mental and physical health. The influencing factors causing such negative effects are relevant from an individual and public health perspective. The personality as one possible influencing factor was discussed. This study investigated the prevalence of the type-D personality in an unemployed population and its connections to socio-demographic, psychological and heart rate variability (HRV) parameters.

Methods:

A questionnaire set including socio-demographics, type-D scale (DS14), Complaint list (BL), Beck-Depression-Inventory II (BDI-II) and the General Self-Efficacy Scale (GSE) was handed out to 203 unemployed individuals [126 females, mean age ± SD: 42.36 ± 11.08]. For HRV assessment (RMSSD), a subsample of 83 participants [50 females, median age ± IQR: 47.00 ± 17.00] passed the "stress-tests" (timed breathing, d2-attention-stress-test, math test) while heart frequency (HF) was acquired *via* the Stressball software (BioSign GmbH, Ottenhofen, Germany).

Results:

53% of the unemployed had a type-D personality. Compared to non-type-D individuals, type-D individuals had rarely children and by trend a lower educational level; they showed significantly higher scores in the BDI-II and lower scores in the GSE and BL. No differences were observed in mean HF or RMSSD during all the stress-tests.

Conclusion:

The HRV of individuals with a type-D personality is no worse than that of individuals without a type-D personality. Type-D personality was significantly associated with negative health effects regarding depressiveness, self-efficacy and physical complaints. Our main findings implicate that the DS14 could serve as a short and reliable screening instrument to select concerned unemployed individuals who might be at risk for negative health effects for adequate intervention.

Keywords: Type-D personality, Heart rate variability, RMSSD, Unemployment, Depressiveness, Self-efficacy.

1. INTRODUCTION

Almost every fifth person (18.3%) in Germany was unemployed at the beginning of this study in 2005 [1]. The negative effects of unemployment on mental health [2 - 6] and physical health [7 - 9] are well known. Even higher

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mortality rates [10 - 14] and suicidal tendencies [12, 14] have been reported. The fact that the unemployed use inpatient treatment eight times as much due to psychological distress [11] and that they had been prescribed antidepressant medication twice as much as the employed [15] emphasizes the importance to investigate possible influencing factors causing these negative effects.

So far, there is a lack of studies addressing the possible vulnerability factors that lead to a decline in the psychological and physical state of health among the unemployed. The individuals' personality might be an influencing factor, which, in the case of experiencing unemployment, may decide whether the individual will be more or less capable of coping with the stress factors accompanying unemployment (such as financial problems, repeated rejection at job interviews, low social recognition) or will rather experience negative psychological impairment, developing, for instance, adaptation disorder, or not. In the framework of risk factors, the personality construct of a type-D personality was investigated which is marked by a high level of social inhibition (SI) and negative affectivity (NA) [16]. It is imaginable that this personality pattern is to be found more frequently among the unemployed since it is more difficult to place introverted, socially inhibited individuals as well as individuals with a negative affectivity on the job market than individuals who do not display these kinds of characteristics.

According to Denollet, individuals with a type-D personality are marked by two characteristics: Negative affectivity and social inhibition [16]. NA is to be understood as the first aspect of the personality and describes the tendency to experience negative emotions [17, 18]. Individuals with a high NA experience more discomfort, distress, and anxiety at any time and in every situation. They tend more toward introspection and are more inclined to perceive only the negative sides of themselves and their surroundings [17]. Furthermore, they more frequently report negative disposition conditions than individuals with a low NA [19]. NA, however, also shows connections to anger, hostility, and aggressiveness [20, 21]. Several studies were able to show that NA correlates closely with the scale neuroticism of the NEO-FFI [21 - 24, 16]. The second aspect of the type-D personality is SI which is the tendency to repress the expression of emotions and modes of behavior in social interactions. Individuals with high SI try to avoid potential dangers which might be looming behind social interactions. Disregard by another person, for instance, would represent a potential danger to a socially inhibited individual. Individuals with SI feel uptight, tense, uncomfortable, and insecure when they meet other people [25]. Social Inhibition correlates strongly negative with the scale extraversion of the NEO-FFI [23] and the Eysenck Personality Questionnaire [24]. SI is associated with high emotional and personal distress. Individuals who have high SI avoid interpersonal conflicts by excessively controlling the expression of emotions and modes of behavior [25]. The criteria of a type-D personality are met when an individual is marked by high NA and high SI. Numerous investigations have examined the type-D personality as a risk variable. Type-D personalities are very anxious and have a hopeless outlook on things [26].

In respect to the prevalence of type-D personality, different prevalence rates among the normal population have been reported: from German studies 21.5% [21] to 32.5% [27], from the Netherlands 13.3% [28], 21.0% [16] and in Hungary 9.4% [27]. An American study, on the other hand, found the type-D pattern much more frequently: 43-61% [29]. Furthermore, several studies were able to find substantial gender-specific differences. For this, however, there are still some controversial data. In the study by Grande *et al.* [27] the proportion of the women with a type-D pattern was considerably higher than the proportion of men with a type-D pattern. Nevertheless, in a German study [9] and in the already mentioned American study [29], the male participants more frequently had a type-D personality.

In order to understand the impact of type-D personality on psychological distress and health the differences in autonomic response in respect to type-D personality was investigated. An increase in NA is associated with a decrease in the heart rate variability (HRV) [30, 31]. HRV reflects alterations in the time series of consecutive heartbeats and is of great importance to health [32]. The HRV is controlled by the balanced interaction of the sympathetic and parasympathetic autonomous nervous system. Reduced HRV parameters indicate a disruption in autonomic balance. The HRV can be reliably evaluated by means of the root mean square of successive differences (RMSSD), even in short (1 min) and ultra-short (10 sec) ECG recordings [33]. Reduced HRV parameters have proved to be an independent risk factor for cardiac events and cardiopathies [32, 34]. Also, an association between the type-D personality and poor cardiovascular functioning have been reported [35, 36]. In a retrospective survey, the study group of Denollet reported on higher mortality rates after six to ten years among participants in a cardiac rehabilitation program with a type-D pattern compared to those without a type-D pattern [37, 38]. Bleil *et al.* [30] see NA as the factor which is the damaging element that leads to dysregulations of the autonomous nervous system. Furthermore, the inhibition of emotions is accompanied by a decrease in the HRV [39]. Further connections could be shown with social isolation, which led to a reduction in the HRV. Individuals who had only little social support showed a significantly decreased HRV [39].

However, contrary to these results, two study groups found no differences in respect to HRV parameters of the time and frequency domain between type-D and non-type-D personalities [40, 41]. The aim of this study was to test if the DS14 as a short screening instrument was able to select those individuals who are at risk for negative effects of unemployment. Specifically, based on our European centered literature review, we hypothesize that individuals with a type-D pattern show decreased RMSSD parameters as well as symptomatic values in the psychological terms investigated as compared to those individuals without a type-D pattern.

2. MATERIALS AND METHODS

2.1. Study Participants

A total of n = 236 volunteers from the vicinity of Dresden were screened for participation in this study. Inclusion criteria encompassed unemployment for at least six months, fluent German language knowledge and age between 18 and 60 years. Those who reported alcohol or substance abuse, pulmonary, cardiac or endocrinological diseases, arterial hypertony, malnutrition, underweight or the intake of heart frequency influencing medication, especially beta blockers, tricyclic antidepressants or thyroid hormones, were excluded from this study. Due to missing sociodemographic information a total of n = 33 individuals were excluded from data analysis, resulting in a final sample of n = 203 participants. The description of the sample is provided in Table **1**.

Table 1. Description of the study sample. Mean (SD) are listed except where noted.

Measure	
Female [n (%)]	126 (62.1)
Age (years)	42.36 (11.08)
BMI	26.17 (7.68)
Type-D personality pattern [n (%)]	108 (53.2)
Seeking employment	188 (92.6)
Times being unemployed [n (%)] Never Once Twice Thrice Four times Five times and more	 3 (1.5) 34 (16.7) 10 (4.9) 13 (6.4) 16 (7.9) 127 (62.6)
Marital status [n (%)] Married In a steady relationship Single Divorced Widowed	 64 (31.5) 29 (14.3) 61 (30.0) 44 (21.7) 5 (2.5)
Children (yes) [n (%)]	130 (64.0)
Education [n (%)] University studies Polytechnic studies Apprenticeship No professional training	 38 (18.7) 26 (12.8) 123 (60.6) 16 (7.9)

Note: BMI = body mass index.

For HRV evaluation, a subsample of n = 83 volunteers were recruited who applied for HRV-biofeedback-training. All the study participants provided written informed consent. The study protocol was approved by the local Ethics Committee of the Medical Faculty of the Technical University of Dresden, Germany (No# EK148082006).

2.2. Procedures

The survey took place by way of a questionnaire set to assess socio-demographic variables as well as the psychological status. For HRV assessment, the so-called "stress tests" were carried out which consist of five parts. The mean heart frequency (HF) and RMSSD time domain measure [ms] were calculated. The stress tests were the following: (1) 1-minute timed breathing interval (deep respiration with six breathes per minute), (2) 3-minute measurement under stress condition (d2-attention-stress-test) [42], (3) 1-minute timed breathing interval (deep respiration with six breathes per minute), (4) 3-minute measurement under stress condition (math task drawn from the Trier Social Stress Test, TSST) [43], (5) 1-minute timed breathing interval (deep respiration with six breathes per

minute). The protocol of the stress-tests has been described in detail elsewhere [44].

2.3. Psychopathological Assessments

The type-D personality, the self-efficacy and the psychopathological burden were measured by different questionnaires. The Type-D-Scale (DS14) [16] consists of the two subscales negative affectivity and social inhibition two assess type-D-personality pattern, each consisting of 7 items which are rated on a five-point-Likert scale (range 0-56). To differentiate psychological and physical impairment, the Complaint List (BL) [45] was used which consists of 24 items with a four-point rating scale (range 0-72). To evaluate depressive symptoms, the Beck-Depression-Inventory (BDI-II) [46, 47] was used which contains 21 symptoms according to DSM-IV criteria that are rated in terms of intensity from 0 to 3 (range 0-63). The general self-efficacy scale (GSE) [48] evaluates subjects' sense of personal competence to master stressful situations. The GSE scale contains 10 items which are rated on a four-point-Likert scale (range 10-40).

2.4. HRV Measurement

For HRV recording the Stressball software program (BioSign GmbH, Ottenhofen, Germany) and for the evaluation of the data, the HRV-Scanner software program (BioSign GmbH, Ottenhofen, Germany) was used. HF was automatically detected by the way of the pulse wave which was recorded by an infra-red sensor positioned on the earlobe. Automatically recorded heartbeats were then manually checked for artifacts. Artifacts and extra systoles were manually filtered out by the author (KW) according to the product instruction. Maximally two extra systoles or artifacts each were accepted per measurement. Hence, it was permissible to delete two RR-intervals. The subsequent calculation of the mean HF and RMSSD took place automatically with the above mentioned software program. RMSSD parameters were subject to logarithmic transformation.

2.5. Statistical Analysis

Group differences in sociodemographic and psychological variables were analyzed by linear regression analysis for continuous variables with the type-D personality pattern as dependent variable, and Chi-square test (χ^2) for dichotomous variables. Non-parametric Mann-Whitney-U-tests were used when appropriate after testing for normality with the Kolmogorov-Smirnov-test. In respect to cardiac parameters, a Student t-Test was carried out separately for the individual testing conditions (timed breathing, d2-attention-stress test, math test). Data analyses were performed using SPSS v. 22 (SPSS Inc., Chicago, IL, USA).

3. RESULTS

The prevalence of the type-D personality in the unemployed population and connections to socio-demographic and psychological parameters was investigated. Table **2** summarizes these parameters as a function of type-D personality. The type-D pattern was found in 53% of the unemployed subjects (n = 108). No significant gender differences (p = .566) were observed between the unemployed who reported a type-D pattern and those unemployed without a type-D pattern. There were no significant differences in age, BMI, marital status or educational level (p's ≥ .083). A non-significant trend finding emerged in respect to the educational level between individuals with a type-D pattern and those without a type-D pattern (p = .083), with individuals who reported a type-D pattern having a tendentially lower educational level. Concerning the incidence of having children, a significant difference emerged ($p \leq .01$) between subjects with and without a type-D personality pattern. Within the non-type-D group more individuals reported having children. With regards to the HRV subsample, basically the same results were observed. However, the differences reported in the educational level reached statistical significance. No significant differences were observed regarding the incidence of having children.

Table 2. Demographic and psychological characteristics. Median (IQR) are listed except where noted.

	Whole sample			**HRV-sample**		
	Type-D (n = 108)	**Non-type-D (n = 95)**	**Statistics**	**Type-D (n = 47)**	**Non-type-D (n = 36)**	**Statistics**
Female gender [n (%)]	65 (60.2)	61 (64.2)	χ^2 = 0.348, df = 1, p = .566	30 (63.8)	20 (55.6)	χ^2 = 0.583, df = 1, p = .295
Age (years)	41.50 (20.00)	44.00 (17.0)	*Beta* = -.094, p = .165	45.00 (22.00)	47.00 (16.00)	U = -1.263, p = .209
BMI	24.65 (6.62)	25.39 (8.93)	*Beta* = -.088, p = .188	25.43 (8.55)	25.18 (5.38)	U = -.261, p = .797

(Table 2) contd.....

	Whole sample			HRV-sample		
	Type-D (*n* = 108)	**Non-type-D (*n* = 95)**	**Statistics**	**Type-D (*n* = 47)**	**Non-type-D (*n* = 36)**	**Statistics**
Marital status [n (%)][a] Married In a steady relationship Single Divorced Widowed	30 (27.8) 13 (12.0) 38 (35.2) 24 (22.2) 3 (2.8)	34 (35.8) 16 (16.8) 23 (24.2) 20 (21.1) 2 (2.1)	χ^2 = 3.996, df = 4, p = .182**	13 (27.7) 7 (14.9) 10 (21.3) 12 (25.5) 3 (6.4)	15 (41.7) 3 (8.3) 9 (25.0) 6 (16.7) 0 (0.0)	χ^2 = 5.069, df = 4, p = .336
Children (yes) [n (%)][b]	60 (55.6)	70 (73.7)	χ^2 = 7.213, df = 1, p = .008***	28 (59.6)	29 (80.6)	χ^2 = 3.693, df = 1, p = .090†
Education [n (%)] University studies Polytechnic studies Apprenticeship No professional training	16 (14.8) 10 (9.3) 71 (65.7) 11 (10.2)	22 (23.2) 16 (16.8) 52 (54.7) 5 (5.3)	χ^2 = 6.712, df = 3, p = .083†*	5 (10.6) 7 (14.9) 34 (72.3) 1 (2.1)	15 (41.7) 9 (25.0) 12 (33.3) 0 (0.0)	χ^2 = 15.588, df = 3, p = .001***
BL [0-72][c,d]	40.66 (12.60)	47.13 (12.13)	*Beta* = .107, p = .234	41.95 (12.15)	49.84 (11.13)	t = 2.856, df = 71, p = .006**
BDI [0-63][d]	18.00 (12.00)	10.00 (11.00)	*Beta* = .322, p = .001***	18.00 (11.00)	8.00 (5.00)	U = -4.848, p = .000***
GSE [10 - 40][d]	23.00 (9.00)	30.00 (5.00)	*Beta* = -.357, p = .000***	24.00 (5.00)	30.50 (5.00)	U = -4.910, p = .000***

Note: Type-D = unemployed with a type-D personality; Non-type-D = unemployed without a type-D personality; BMI = body mass index; BL = sumscore of the complaint list; BDI = sumscore of the Beck-Depression-Inventory II; GSE = sumscore of the general self-efficacy scale. * p ≤ .05; ** p ≤ .01; *** p ≤ .001; † .05 < p < .10

[a] n = 2 missing values in the whole sample, n = 3 missing values in the HRV sample.

[b] n = 1 missing value in the HRV sample.

[c] Mean (SD) are listed.

[d] n = 173

With respect to psychological measures, participants with a type-D personality pattern reached a significantly higher BDI-II-sumscore and a significantly lower GSE-sumscore than those without a type-D pattern (p's ≤ .001). The Chi-squared test revealed significant differences in the severity of depressive symptoms according to the BDI-II cut-off between subjects with type-D personality and those without (χ^2 = 32.547, df = 3, p ≤ .001). The distribution of the BDI-II severity groups in the type-D personality group were as follows (distribution of BDI-II severity groups of the non-type-D personality group in brackets): no clinically relevant depressive symptoms n = 23 (53), mild depressive symptoms n = 29 (13), moderately depressive symptoms n = 29 (13) and severe depressive symptoms n = 12 (1).

Concerning cardiac parameters, individuals with a type-D pattern did not differ from individuals with a non-type-D pattern in respect to the mean HF (p's ≥ .270) or to the RMSSD (p's ≥ .065). This was true for the measurements during timed breathing, during the d2-attention-test and during the math test.

Table 3. Cardiac parameters of the subsample. Mean (SD) are listed.

Measure	Type-D	Non-type-D	Test statistic
Mean HF Timed breathing d2-attention-test math test	75.93 (9.02) 83.71 (8.95) 83.86 (9.78)	76.91 (10.49) 85.88 (10.23) 86.64 (10.70)	t = 0.457, p = .649 t = 0.992, p = .325 t = 1.112, p = .270
RMSSD[a] Timed breathing d2-attention-test math test	1.58 (0.25) 1.36 (0.18) 1.42 (0.19)	1.58 (0.26) 1.28 (0.20) 1.35 (0.19)	t = 0.124, p = .902 t = -1.872, p = .065 t = -1.573, p = .120

Note: HF = heart frequency, RMSSD = root mean square of successive differences.

[a] all RMSSD parameters were subjected to logarithmic transformation.

4. DISCUSSION

Unemployment brings to bear negative effects on the psychological [2 - 6] as well as the physical state of health of those affected [7 - 9]. The influencing factors causing these negative results have to be investigated. The personality as one possible influencing factor was discussed. The present study investigated the prevalence of the type-D personality in the unemployed population and connections to socio-demographic and psychological variables as well as to the RMSSD parameter of the HRV.

The prevalence of the type-D personality of the unemployed found in this study (53%) was higher than those in the normal population described in previous European studies ranging from 9.4% up to 32.5% [16, 21, 27, 28]. An American study, on the other hand, found the type-D pattern more frequently (43-61%). Since varying prevalence rates

were found in different regions, type-D personality pattern might be subject to distinct ethnic influences. Hence the here found prevalence rate need to be compared with the German and Dutch studies. Thus, with 53% a higher number of unemployed individuals display the type-D pattern than in normal population, possibly indicating a selection effect. Individuals with a type-D pattern are possibly more susceptible to becoming and remaining unemployed. Kokko *et al.* [49] reported a positive association between inhibited social behavior in childhood and later long-term unemployment. However, Kirchler [50] found no significant differences between unemployed and employed individuals.

With regard to socio-demography, the present data did not show a connection between gender and type-D personality pattern. The respective data situation so far is controversial. In contrast to our results, some studies were able to find gender-specific differences in the prevalence of the type-D pattern. In the study by Grande *et al.* [27], the proportion of women with a type-D pattern was markedly higher than the proportion of men with a type-D pattern (30% vs. 31%). However, some studies demonstrated that men showed significantly more frequently a type-D personality pattern [29, 51]. In respect to age, it was shown that the type-D pattern was found descriptively more frequently among younger age unemployed individuals. This could either be explained by generational differences or by the possibility that the personality pattern may change in the course of a lifetime. In contrast to the latter assumption, Martens *et al.* [52] were able to prove that the type-D personality is a stable construct not influenced by mood alterations like depressiveness and anxiety. A further result of this study is that the incidence of having children was more frequently reported by individuals without a type-D personality. To our knowledge, this had not been described in the literature up to now. It might, however, be in part due to the fact that the individuals with a type-D pattern of this study were by trend younger than those without a type-D pattern. In respect to education, the unemployed with a type-D pattern had a significantly lower educational level as well as less frequently completed their studies than those with a non-type-D pattern. This difference is in accord with the results of Kokko *et al.* [49] who reported that the difference between inhibited social behavior in childhood (passive and timid behavior) and long-term unemployment later on in life was explained by the lack of education. SI represents a core symptom of the type-D personality. The fact that most of the unemployed individuals with a type-D pattern of this study had by trend a lower educational level supports data by Kokko *et al.* [49]. This is further supported in as much as it could be proved that the type-D personality is a stable construct which cannot be influenced by mood alterations such as depressiveness and anxiety [52]. Also, the inheritability found for the type-D pattern seems to support this theory [53]. Hence it can be assumed that the personality is the least influenceable variable within the above cited relationships, thus to be seen as the core of the problem. However, without longitudinal studies these suggestions remain rather speculative.

With regard to depressive symptoms, our results are in accord with prior reported associations between the type-D personality and an increase in depressiveness [23, 54, 55]. The fact that the unemployed with a type-D pattern reached a median sum value of 18.00 (IQR 12.00) in the BDI-II is alarming since a point value of 19 is the established cut off score between mild and moderately depressive symptoms [46]. A total of 70 individuals with a type-D personality pattern (65%) reported mild to severe depressive symptoms. It appears that the type-D personality bears inherent high risk potential for developing depressive symptoms if unemployment occurs.

In respect to somatic complaints, previous studies demonstrated that individuals with a type-D personality suffer from a perceived worsened state of health and more frequently show aches, pains and fatigue [54] and other symptoms of somatization [23, 37]. Our results disagree partly with these prior findings. Individuals with a type-D pattern reached descriptively lower BL-sumscores compared to individuals with a non-type-D pattern. However, both groups reported pathological symptom loads highly above the value of 28 [45].

With regard to the self-efficacy expectation, several studies were able to prove that unemployment is associated with a low self-efficacy expectation [56] as well as with low self-esteem and low self-respect [6, 57, 58]. Our results agree with prior studies. Unemployed individuals with a type-D pattern had a significantly lower general self-efficacy expectation than unemployed individuals without a type-D pattern. With a median value of 30.00 (IQR 5.00) the individuals without a type-D pattern could easily be placed in line with comparable normative ranges collected for the same age class (men of the same age class reached 30 points and women around 29 points with an SD of 5 points [48, 59]. The individuals with a type-D pattern, however, with a median value of 23.0 (IQR 9.00) showed a lower sum value in reference to the general self-efficacy expectation than the norm. Hence the individual personality, aside from the influence variable unemployment of those concerned, seems to play an additional role.

In reference to the cardiac parameters, no differences were observed between individuals with a type-D pattern and those without a type-D pattern, neither in mean HF nor in the RMSSD during timed breathing as well as under both stress conditions. The HRV of individuals with a type-D personality pattern seems no worse than that of those

individuals with a non-type-D pattern. The results of this study agree with that of prior investigations. Prior findings demonstrated both an association between NA and a reduced HRV [30, 31] as well as between emotional inhibition and SI and a reduced HRV [39]. However, our results agree with recent findings of Kang *et al.* [40] and Nowicki [41] who also did not report differences in HRV between subjects with a type-D pattern and subjects without a type-D pattern. This might be explained by the number of cases being too small. For the conduction of a t-Test for independent samples, higher case numbers would be necessary, which could not be carried out in the framework of this particular question. Another limitation of this study is that we didn't meet two recommendations of the Task Force [32] concerning HRV assessment. HF was derived by way of the pulse wave instead of *via* ECG recording. However, this method appears just as well reliable and not more interference-prone like ECG recording. Secondly, the Task Force [32] recommends 5 minutes duration of ECG recording for short-term HRV assessment. In the present protocol, stress conditions lasted only 3 minutes and paced breathing was performed for 1 minute. Since ECG analysis was restricted to RMSSD and previous findings report on the reliability of the RMSSD for HRV assessment from recording of 1 minute and even of 10 seconds [33], the present recording duration appears to be sufficiently reliable. Another limitation is that we didn't investigate a reference population to establish normal ranges. Future studies should consider this.

In conclusion, unemployed subjects with the type-D pattern seem to be more burdened psychologically by unemployment than subjects without the type-D pattern. This study aimed identifying factors accounting for negative health effects in unemployed individuals. The results found imply that especially unemployed individuals with a type-D personality pattern need to find increased attention due to increased levels of depressiveness and decreased self-efficacy. Our findings tentatively suggest that the previous reported associations between unemployment and its psychological consequences such as depressiveness [2 - 6, 8, 15, 60 - 64], a worsened subjective state of health, and an increase in the occurrence of somatic complaints [2, 12, 65 - 67] may not only be attributed to unemployment itself but also that the individual personality of those concerned may have an impact. Our main findings implicate that the DS14 could serve as a short but reliable screening instrument to select the distressed unemployed who might be in need of intense attention for adequate intervention.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

No Animals/Humans were used for studies that are base of this research.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTEREST

The author confirms that this article content has no conflict of interest.

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